EXPANDED COURSE DESCRIPTION
EARTH, SPACE SCIENCE AND ENGINEERING
Lassonde School of Engineering
Earth and Space Science and Engineering
LE / ESSE 2640 3.0 SECTION M
ADJUSTMENT CALCULUS
FALL 2018 / WINTER 2019

Last Modified Date: 08/20/2018

COURSE CALENDAR DESCRIPTION

Minima and maxima of functions, Lagrange multipliers. Quadratic forms. Observables, observations, parameters and mathematical models. The least squares principle; Propagation Errors and Covariance Law; weight matrix and variance factor; parametric, condition and combined adjustments. Course Credit Expclusions: LE/ESSE 3620 3.00. Prerequisites: SC/MATH 1025 3.00; SC/MATH 1014 3.00; SC/MATH 2015 3.00; SC/MATH 2930 3.00; LE/ESSE 2620 3.00; LE/EECS 1021 3.00 or LE/EECS 1541 3.00

INSTRUCTOR(S)

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<tr>
<th>Name</th>
<th>Section / Format / Term</th>
<th>Contact Email</th>
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<tbody>
<tr>
<td>Jadidi Mardkheh, Amaneh</td>
<td>Sec. M / LECT / W</td>
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ADDITIONAL INFORMATION

This Course provides the fundamental concepts of using the method of least squares and calculus variations to solve geodetic problems such as reference control network that involves many more observations than actually needed, thus, providing many possible solutions due to the errors present in the observations. This course will systematically develop three different classes of mathematical models that link parameters of interest (unknown) with observable (quantities we can measure). Once appropriate mathematical model has been formulated to represent the relation between the observable and the unknowns, it can become the subject of rigorous mathematical calculus. With the contribution of the theory of errors, and the calculus of variations, we can obtain a unique solution (if it exists) for the unknowns that will be most accurate (minimum variance). We will be able to estimate the accuracy of the solution by using the covariance law that allows the propagation of the measurement errors to the unknown via mathematical model.

COURSE LEARNING OUTCOMES

1. Apply the fundamental concepts to set up the theoretical principles of least-squares adjustment. GAIs 1c,d, f, 2a,d, g, 4b,f, 5e, 6b
2. Demonstrate covariance matrices and covariance law using simple practical examples. GAIs 1c,d, g, 2a,d, e, g
3. Apply the fundamental mathematical concepts and models to set up and perform parametric adjustment. GAIs 1c,d, e, f, g, 2a,b, d, e, g, 3a,c, e, 4a,b, 5b,c, d, e, 6b, 7e, 11b
4. Compute adjustments (e.g. conditional, combined, parametric etc.) through software development, mathematical models and applied on survey projects. GAIs 1d,g, 2a,d, e, 4b, 5a,b,c,d
5. Identify and determine the types of measurement errors and the approach to determine degrees of freedom. GAIs 1c,d, e, f

GRADING BREAKDOWN

Laboratory assignments, final project and presentation- 37.5%
Class Participation - 7.5%
Midterm Exam - 15%
Final Exam - 40%

REQUIRED TEXT

SUGGESTED TEXTS AND MATERIALS

Questions Bank
C2: https://cbeps-cceag.ca/previous-years-exams

ACADEMIC INTEGRITY LINKS
- Senate Policy on Academic Honesty - http://secretariat-policies.info.yorku.ca/policies/academic-honesty-senate-policy-on/
- Academic Integrity - http://lassonde.yorku.ca/academic-integrity

STUDENT LINKS
- Student Rights and Responsibilities - http://oscr.students.uit.yorku.ca/student-conduct
- Religious Observance - https://w2prod.sis.yorku.ca/Apps/WebObjects/cdm.woa/wa/regobs
- Counselling and Disability Services - http://cds.info.yorku.ca/
- York University’s Policies on Gender/LGBTQ*/Positive Space - http://rights.info.yorku.ca/lgbtq/

LAND ACKNOWLEDGEMENT
- We acknowledge our presence on the traditional territory of many Indigenous Nations. The area known as Tkaronto has been care taken by the Anishinabek Nation, the Haudenosaunee Confederacy, the Huron-Wendat, and the Métis. It is now home to many Indigenous Peoples. We acknowledge the current treaty holders, the Mississaugas of the New Credit First Nation. This territory is subject of the Dish With One Spoon Wampum Belt Covenant, an agreement to peaceably share and care for the Great Lakes region.
- The Indigenous Framework for York University: A Guide to Action can be found here: http://indigenous.info.yorku.ca/
- Meaning of a land acknowledgement: http://healthydebate.ca/opinions/indigenous-land-acknowledgements

Many courses utilize Moodle, York University's course website system. If your course is using Moodle, click here to access it.
Moodle @ York University